

CLAIMS

We Claim:

1. A process for polymerizing olefin(s) to produce a polymer product, the process comprising contacting ethylene and at least one comonomer with a catalyst system, wherein the catalyst system comprises a poor comonomer incorporating catalyst compound having at least one fused ring cyclopentadienyl based ligand and a good comonomer incorporating catalyst compound, and wherein the polymer product has a bimodal composition distribution; characterized in that the poor comonomer incorporating catalyst compound has a density as a function of ethylene:1-hexene profile of greater than $y = 14.318x^2 - 1.4146x + 0.9523$, wherein y is the density function and x is the ethylene:1-hexene mole ratio function.
2. The process of claim 1, wherein the poor comonomer incorporating catalyst compound comprises at least one fused ring cyclopentadienyl based ligand directed to the front of the molecule by an angle α which is greater than 30 degrees.
3. The process of claim 2, wherein α is greater than 60°.
4. The process of claim 2, wherein the poor comonomer incorporating catalyst compound comprises two fused ring cyclopentadienyl based ligands, wherein the angle α of one of the two ligands is about 70° to about 90° and wherein angle α of the second of the two ligands is greater than 15°.
5. The process of claim 4, wherein the angle α of one of the two ligands is about 70° to about 90° and wherein angle α of the second of the two ligands is greater than 45°.
6. The process of claim 1, wherein the polymer product is formed into a film.
7. The process of claim 1, wherein the process is a gas phase process.

8. The process of claim 1, wherein the poor comonomer incorporating catalyst compound requires a comonomer to monomer mole ratio at least two times that of the good comonomer incorporating catalyst compound to prepare the same density polymer.
9. The process of claim 8, wherein the poor comonomer incorporating catalyst compound requires a comonomer to monomer mole ratio of at least three times that of the good comonomer incorporating catalyst compound.
10. The process of Claims 8 or 9, wherein the density of the polymer is 0.20 g/cm³.
11. The process of Claim 1, wherein the poor comonomer incorporating catalyst compound is further characterized as a metallocene polymerization catalyst compound which produces a higher density polyethylene, under similar processing parameters, when compared to bis(indenyl) zirconium dichloride.
12. The process of Claim 1, wherein the poor comonomer incorporating catalyst compound comprises a metallocene structure comprising at least one fused ring cyclopentadienyl ligand bridged to another cyclopentadienyl ligand, where the bridge is a long bridge defined as a bridge containing 2 or more atoms.
13. The process of claim 1, wherein the at least one comonomer is selected from alpha-olefins having from 4 to 15 carbon atoms.
14. The process of claim 1, further comprising isolating a polymer product having an Mw/Mn value of from 2.5 to less than 8 and an I₂ value of from 0.1 to 100 dg/min.
15. The process of claim 14, wherein the polymer product possesses a CDBI of from 55% to 85%.